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Culminating Capstone Project: Critical Illness Myopathy

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OTD 8494: Doctoral Capstone Experience, Reflections & Exit Colloquium

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Abstract

The capstone project was completed in the focus area of clinical practice skills at AdventHealth hospital. The objective was to educate the rehabilitation team on critical illness myopathy (CIM), a condition that was requested to be further investigated by Megan Graf, OTR/L, who served as the capstone mentor. Through an extensive search, a literature review was completed. The rehabilitation team was informed scholarly and clinically with a PowerPoint presentation. Currently there is a gap within the literature between occupational therapy and CIM. Conversely, physical therapy had a plethora of research conducted on patients with CIM.

Introduction to Capstone Project

My Capstone Experience (CE) was completed at AdventHealth hospital between two campuses, Apopka and Altamonte Springs. The focus area for my CE was in clinical practice skills, with the majority of my time spent in the acute setting. During my time at AdventHealth, I developed my critical thinking skills, clinical judgments, and communication skills, all within a fast-paced environment. My mentor, Megan Graf OTR/L, has been an occupational therapist with AdventHealth for approximately 3 years and treats a variety of conditions from general weakness and cerebrovascular accidents to COVID-19. Megan treats patients in all units, including the intensive care unit (ICU) and progressive care unit (PCU). However, she expressed an interest in acquiring further knowledge on critical illness myopathy (CIM).

My final culminating project consisted of completing a literature review on CIM and presenting my findings to the rehab team. The literature review utilized up-to-date research and evidence to educate not just myself, but the rehab team as well, to help patients who may have a prolonged stay in the ICU and could potentially develop this condition. Additionally, the majority of my CE involved treating patients with various conditions, such as cardiac, neurological, and/or respiratory. Towards the end of my CE, I had the opportunity to observe in different units, including the advanced cardiac surgical unit (ACSU), neuro ICU (NICU), and inpatient rehabilitation unit (IPR).

Within the ACSU, I was introduced to an extracorporeal membrane oxygenation (ECMO) machine that assists in blood transfusion with oxygen. A patient is placed on this life support machine due to the inability to supply oxygenated blood. The ECMO machine was commonly used with patients who had severe complications from COVID and other complex respiratory conditions. A left ventricular assist device (LVAD) was common to see on the

ACSU. The LVAD is a portable device to assist a failing heart with pumping. The device must always have either a rechargeable battery and be connected to an outlet or have two rechargeable batteries connected to the device.

During my time in the NICU, I was exposed to an external ventricular drain (EVD). The function of the EVD is to drain cerebrospinal fluid from the ventricles to decrease pressure on the cerebrum. The EVD also allows monitoring the pressure within the ventricles. Prior to moving the patient, the EVD must be clamped to a pole or stable surface to allow proper measurements. During my observation, I gained a vast amount of knowledge about neurological conditions such as strokes, hydrocephalus, and encephalitis and how patients with these conditions can benefit from occupational therapy (OT).

AdventHealth's IPR unit had been open for approximately one year and had various equipment and up-to-date technology. The IPR is well-organized, and therapists must have good communication skills to discuss a patient's outcome with the team (doctor, nurse, care manager, physical therapist, and speech therapist). The therapist I followed scheduled her patients so that there were no co-treatments because she believed one-on-one therapy sessions were crucial during the recovery period. She scheduled each day's patients for 60 minutes of OT, and those treatments either consisted of activities of daily living (ADL) tasks such as bathing and grooming, strengthening exercises, endurance activities, and education.

Literature Review

Background

Treating critically ill patients in the intensive care unit (ICU) can be a difficult task to accomplish for the rehabilitation team, such as the physical therapists, occupational therapists, and speech therapists. In this unit, occupational therapists (OT's) receive physician's orders to complete an evaluation, which is one of the components for beginning the patient's functional mobility participation. The evaluation provides the patient an opportunity to be one step closer to transfer onto a unit where patients are more medically stable and to, ultimately, return home. According to Pattanshetty and Gaude (2011), 46% of patients with complex cases, such as sepsis or requiring prolonged ventilation, present potential risk factors for acquiring a neuromuscular muscle disorder. The conditions are significant risk factors for developing critical illness myopathy (CIM, Fan, 2012). CIM is an acquired condition, causing muscles to atrophy due to prolonged immobility, typically from heavy sedation (Pattanshetty & Gaude, 2011). This literature review will identify areas for improving outcomes for critically ill patients during the acute phase, and how OT's can best provide services for these patients.

Prevention

Depending on the severity of a patient's condition, the ICU limits mobility by utilizing sedation; however, prolonged sedation can result in acquired weakness and potentially progress to CIM. Minimizing sedation within the ICU will further increase long-term cognitive function and decrease delirium (Kimberly et al., 2019). This is imperative during waking periods for patients to participate in activity daily living (ADL) tasks during therapy sessions. Heavily sedated patients may take days to recover from the confusion associated with the chemical imbalances from medications. For example, if a patient becomes alert after sedation and becomes

agitated or not following commands, therapy services will be inappropriate for that day, which can, ultimately, result in a longer hospital stay. Dalton et al. (2012) warned that limiting risk factors, such as treating sepsis quickly and avoiding the use of corticosteroids, will reduce a patient's chances of acquiring CIM. Treating hyperglycemia has been deemed beneficial when limiting risk factors for CIM (Ramrakhiani, 2016). Furthermore, waking up patients and providing early mobilization and breathing treatments provide positive outcomes (Kimberly et al., 2019). Allowing patients to have spontaneous waking periods further improves physical and mental outcomes as they participate in basic ADL tasks during occupational therapy sessions.

Early Mobilization

OTs can provide early functional mobilization to prevent CIM. Researchers have noted that early mobilization, such as passive range of motion and active range of motion, can provide a quicker recovery in preparation for ADL tasks (Pattanshetty & Gaude, 2011). Approximately 82% of ICU patients that received therapy services demonstrated a decrease in acquiring CIM (Patel et al., 2014). The level of physical activity and exercise intensity should be matched to the patient's condition and activity tolerance (Jang et al., 2019). Patients presenting with poor respiratory and/or heart rates should not have rigorous exercise plans, which could result in detrimental effects rather beneficial. Hashem et al. (2016) noted that patients given rehabilitation services in the ICU showed positive outcomes for less time on mechanical ventilation systems, fewer days experiencing delirium, and returning to prior levels of function. Early mobilization promotes positive outcomes post-hospitalization when ICU patients return back to home.

Limited research has been performed on appropriate interventions for patients with CIM. Physical therapists and OTs typically cotreat together to maximize the patient's performance. OTs can target the functional transfer tasks required for ambulation prior to physical therapists

attempting ambulation. Early mobilization may include ambulation; however, functional transfers, such as supine to sit or sit to stand, are key components prior to walking (Fan, 2012). Researchers have revealed that early physical and occupational therapy within the ICU is feasible and significantly reduces recovery time for functional daily tasks (Pattanshetty & Gaude, 2011). Furthermore, OT intervene's by implementing simple self-care tasks, as a means of early mobilization (Fan, 2012).

Prognosis

Patients that are immobilized due to their condition or sedated for a prolonged interval, become physically and cognitively weak. Approximately 25% of patients being discharged from the ICU have a significant loss of independent skills that require assistance (Stam et al., 2020). Many independent skills become impaired, further limiting functional participation with tasks, such as feeding, bathing, or dressing (Kimberly et al., 2019). Cognition and physical dysfunction significantly affect ADL tasks. Sosnowski et al. (2015) pointed out that patients and their families are jointly impacted. Typically, families will provide assistance, which can, ultimately, put a strain on the family. Frequently, clinicians ask if someone at home can assist, and if not, a skilled nursing facility or inpatient rehabilitation is recommended, causing a potential financial burden. Beginning early mobilization to limit stressors and negative outcomes for the family and patient is beneficial.

Conclusion

The ICU culture needs to be modified to benefit the patient's outcome in the acute phase and what comes after the hospitalization. Researchers have recommended early rehabilitation to prevent both delirium and optimize quality of life (Sosnowski et al., 2015). The researchers provided evidence that early activity can prevent physical and cognitive decreases, resulting in

better outcomes. Changing the ICU culture can be a difficult task to accomplish as bed rest has been the traditional practice within this setting. Educating the ICU team on when patients are appropriate for therapy services and the importance on early mobilization greatly improves patient outcomes.

Needs Assessment

The ICU monitors critically ill patients when their conditions are severe and require constant attention. ICU patients are typically under sedation and immobilized, which can lead to other complications. Once patients are awake and alert, OT evaluate patients to begin the functional mobility process. Upon discharge, approximately 25% of patients will have lost some independent skills, limiting their participation in ADL (Kimberly et al., 2019). The purpose of this project is to have a better understanding of CIM and to educate the rehabilitation team about this condition that is acquired within the ICU. Hashem et al. (2016) studied intensive care unit-acquired weakness (ICU-AW), utilizing a randomized population by including patients that were being treated for other medical conditions. The researchers discovered that ICU-AW patients experiencing longer mechanical ventilation durations and hospital stays increased patients' costs and increased mortality rate (30.6% vs 17.2%). Hermans et al. (2008) reported patients can have long-term effects after discharge, including a paralysis (tetraparesis, tetraplegia, or paraplegia). Within an OT's perspective, patients would have difficulty completing their daily self-care tasks whether that is oral hygiene, lower body dressing, or grooming tasks. By providing skilled interventions, OT can promote physical function through self-care tasks and transfers that are feasible in the ICU.

Goals and Objectives

The overall goals achieved by my capstone site and mentor were a better understanding of CIM. I incorporated what I clinically observed and combined it with the journal articles that I obtained through a search of the literature. Completion of my project filled the identified gap by educating the rehabilitation team about what CIM is and strategies to treat and prevent this acquired condition.

- Goal 1: Evaluate ICU patient(s) that have CIM or may have signs/symptoms presenting with this condition.
    - Objective 1: Complete thorough chart reviews which include reviewing lab values, vital signs, and results in regard to tests/scans such as MRI and CT, and if the patient(s) are appropriate for therapy.
    - Objective 2: Be assigned to patients that have this condition and are appropriate to be seen by a student (not required to wear an N-95).
- Goal 2: Understand what CIM is and how it can affect patient's functional status
    - Objective 1: Identify journal articles that explain what CIM is and how it manifests both short-term and long-term.
    - Objective 2: Read journal articles that discuss how CIM can hinder people's level of function and if they are in need of assistance during ADLs.
- Goal 3: Complete an in-service educating the rehabilitation team on my findings
    - Objective 1: Complete and extensive literature review about CIM and how occupational therapy can benefit patients with this condition
    - Objective 2: Advocate for the need to have occupational therapy evaluation and treatments for patients with this condition based on my findings

Synopsis of 16-weeks

My capstone experience was split into four days of treating patients and one day of completing my capstone project. The first two weeks consisted of completing my orientation, introduction to the electronical medical record, and welcomed by the rehab team. The next three to ten weeks, I was improving my clinical documentation skills, evaluating and treating more patients, as well as researching journal articles for my capstone project. Based on my confidence and comfort, I progressively took all of Megan's caseload. Toward weeks eleven through fourteen I researched other conditions and various medical abbreviations in preparation for my observation week, which was week fourteen. At week fifteen, I completed a continuing education course on critical care to enhance my knowledge within this setting. This was beneficial since I did not know the basics of a continuing education course and have to navigate the internet for one.

Unexpected Experiences

There were a few unexpected experiences during my CE. I was hoping to observe a surgery to understand the beginning of the recovery process. Another experience I was not fully immersed with was evaluating and treating patients with airborne precautions. With the severity of COVID-19, I understood why I was unable to treat the patients with this precaution. However, as a future clinician, it would have been beneficial to have some experience. Although I had the opportunity to observe in the advanced units, I was only exposed to these units for a week.

Summary

During my time at AdventHealth, there were many lessons that I learned that will help me grow as a clinician. Some of these lessons are clinical skills, such as learning how to read vital signs, know sedation levels, and how to evaluate patients in a timely manner. I constructed

a list of medications that were commonly used within this population for their conditions see (Appendix A). Understanding the medications helped me understand their impact on the patients and how much they were able to participate during treatment sessions. I had the opportunity to complete a CEU course relating to what purposeful activities OTs can provide within the critical care (see Appendix B).

The site will utilize my capstone project as a means for educating the rehabilitation team and/or other clinicians about patients with CIM and if they are medically appropriate for therapy services. The capstone project will be available not only to my site but all of AdventHealth's campuses upon request from my capstone site. The site will have a physical copy and a digital copy of the literature review that was completed. Additionally, the site will have all the resources that I have utilized for my capstone project. The resources will include the journal articles and links to sites that were used to support the capstone project.

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Appendix A: Medication List

Medication Name	Usage	Side effects
Ativan	Sedative	Drowsiness, dizziness, weakness
Valium	Anxiolytic and sedative	Drowsiness, lightheadedness, weak/shallow breathing
Haldol	Antipsychotic (treat schizophrenia)	Diarrhea, nausea, blurred vision, dizzy
Ateplase (t-PA)	Thrombolytic medication (treat ischemic stroke, STEMI, PE)	Nausea, dizziness, vomit
Amitriptyline	Antidepressant and nerve pain medication	Drowsiness, headaches, weakness/tiredness
Seroquel	Treat schizophrenia, bipolar, and depression	Drowsiness, upset stomach, tiredness, dizziness
Remdesivir	Antiviral (helps treat COVID)	Nausea, constipation, pain, bleeding, bruising of the skin
Dexamethasone	Treat inflammation	Dizziness, insomnia, restlessness
Eliquis	Reduce risk of stroke and blood clots with people who have AFib	Chest pain, bruising, dizziness
Midazolam	Used for sedation	Headache, nausea, drowsiness
Tocilizumab	Reduce pain and swelling caused by rheumatoid arthritis	Headache, dizziness, high blood pressure

Appendix B: CEU Certificate of Completion

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Certificate of Completion

This Certificate Verifies That

Min Yu

1418 Carriage Oak Court, Ocoee, FL 34761

Successfully Completed The Following Course:

Acute Care Back to the Basics: OT's Role in Critical Care Course 4689

Presenters: Lyndsay Laxton, OTR/L & Meghan Morrow, OTR/L

Course Type: Text **Date Completed:** Wednesday, April 14, 2021

Course Description: This webinar will educate occupational therapy practitioners on how to promote OT's role in the critical care unit. It will also equip clinicians from all clinical backgrounds with evidence-based interventions to prevent hospital-acquired deficits and promote quality of life for patients and their families during the most tenuous days of recovery.

CEUs/Hours Offered: AOTA/0.1 Introductory, Category 2: Occupational Therapy Process - Intervention; CE Broker/1.0 Home Study, General (FL), Patient Related (AL), General Continuing Education (GA), Direct Client/patient Services In Occupational Therapy (SC), CE Broker #20-769022; IACET/0.1; NBCOT PDUs/1.25 Beginner, Rehabilitation

Nika Ball, OccupationalTherapy.com
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Appendix C: PowerPoint Presentation

Background

- CIM is an acquired condition which causes muscles to atrophy due to prolonged immobility, typically from heavy sedation
- It may present as symmetrical weakness and flaccidity with proximal muscles impaired more than distal, and sensation is intact.
- Research has suggested that steroids and/or nondepolarizing neuromuscular blockades may change the structure of muscles including the myosin and fatty degeneration of muscle fibers

Risk Factors

- Sepsis
- Corticosteroids
- Multi-organ failure
- Acute respiratory distress syndrome
- Prolonged intubation and immobility

Prognosis

- As patients are admitted into the ICU, upon discharge 25% of the patients have a significant loss of independent skills requiring them to have assistance
- Not only are patients affected but their families are impacted as well, since the families will assist and can ultimately put a strain on the family.
  - Financially
  - Mentally (burn out)

Early mobilization

- A key component that occupational therapists can provide by preventing critical illness myopathy is early mobilization.
- When in the ICU, patients receiving OT/PT, there was an 82% decrease in acquiring CIM.
- There was a study that was conducted on patients in the ICU that were given PT/OT treatments and had a positive outcome for returning to prior level of function, fewer days experiencing delirium, and less time on the mechanical ventilation system
- Studies have revealed that early PT/OT within the ICU is feasible and can significantly reduce recovery time for functional daily tasks.
- Furthermore, occupational therapists can intervene by completing simple self-care tasks as means of early mobilization as patients need to be alert and engaged.

Prevention

- Minimizing sedation within the ICU will further increase long-term cognitive function and decrease delirium.
- Treating hyperglycemia has been deemed beneficial when limiting risk factors for CIM.
- It has been noted that waking patients and providing early mobilization and breathing treatments have positive outcomes.
- There are no pharmacological treatments to cure CIM, but prevention and early recognition have been noted to have the best outcome on treating this condition.